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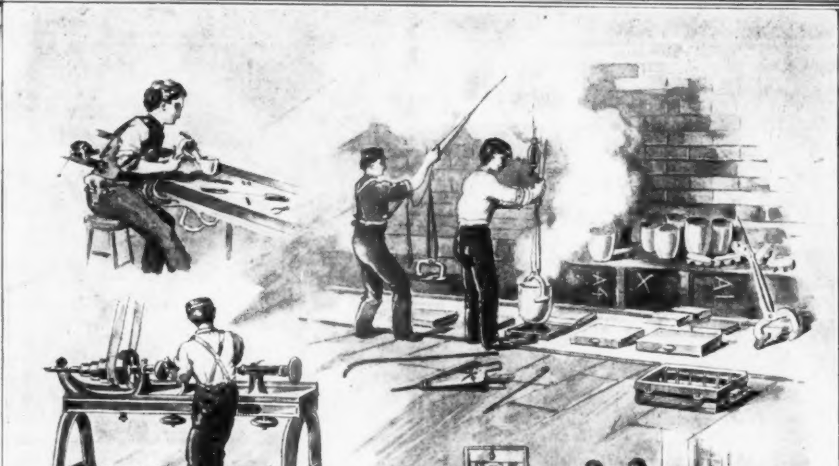

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OLD SERIES Vol. IX. No.
Vol. I., No. 11. NEW SERIES

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NOVEMBER, 1903

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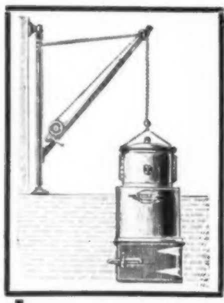

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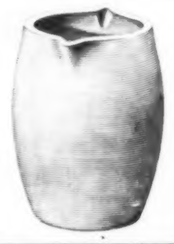

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ADVERTISING RATES ON APPLICATION

Entered February 10, 1903, at New York, N. Y., as Second Class Matter Under Act of Congress March 3, 1879.

DANGEROUS INFORMATION.

One is apt to gauge the value of a trade paper by its circulation and prospective advertisers pay too little attention to the quality of the reading matter contained therein. It is our firm belief that the value of a trade journal is not always proportionate to the amount of its circulation, as such papers are generally supposed to be something more than mere directories. The function of a trade paper, according to our own notion, is first, to furnish matter which will actually be read; second, to have advertising matter which will be read simultaneously with the articles. If the information imparted by the reading matter is bad, one is liable to look with suspicion upon the wares displayed in the advertisements. On the other hand, good, wholesome articles, ones which actually furnish information of a sound character and increase our knowledge of subjects in which we are interested are certain to react favorably for the advertiser. Advertising is judged by the reading matter.

The wisdom of this argument has recently been demonstrated by the answer to the following question printed in a recent issue of one of our contemporaries, a paper which claims a large circulation, and also which has an extensive *clientele* of advertisers. The information desired was, viz:

"Q.—Kindly give the receipt for spelter.

A.—Spelter is a flux which is used in brazing or when uniting brass to iron. It is an alloy of 4 parts of tin with 1 part of lead. Its tenacity and fusibility are greater than those of either of the metals of which it is composed."

We know that mistakes occur wherever mankind is employed, and we ourselves have to admit that we come within this category, but we will allow our readers to say whether THE METAL INDUSTRY has ever been guilty of such flagrant ignorance of the fundamental principles of metallurgy as this. The reader will eventually discover that he has been misinformed as he is a man of intelligence; otherwise he would not seek for information. In this instance, as in many others, he has been deliberately deceived. The advertiser has also been deceived. When confidence in one vanishes, the value of the other likewise disappears. The reader is the one

who determines the destiny of the advertiser as he is a practical man, and upon whose judgement machines or materials are purchased. He will, therefore, be likely to pass the same criticism upon such products that he does upon the quality of the information which a trade journal dispenses.

Which is the better medium for advertising, journals which actually furnish information for the reader or those that deceive him? We ask our readers to judge.

THE PYROMETER IN MELTING.

It is with regret that we have to admit that the pyrometer is of doubtful use in melting metals. The difficulty is not on account of any inaccuracy in the pyrometer itself, but exists in the manner in which it is applied.

The pyrometer is simply a thermometer for registering high temperatures, and its use is particularly alluring when it has been demonstrated time and time again, that the heat at which metal is poured determines its quality. Metal poured too "cold" gives equally as bad results as that poured too "hot," and the only manner in which this pouring temperature can be determined at the present time is by the naked eye. The personal equation of the melter, therefore, enters into the melting proposition to a very great extent.

Pyrometers may be divided into two classes: Those which are actually inserted into the melted metal and the kind which is used like a telescope, and the metal is examined at a distance. The first has several manifestations, but the principal instrument and one, which in trained hands, is capable of giving extremely accurate results, consists of two fine wires, one of platinum and the other of an alloy of platinum and rhodium. These two dissimilar metals when heated produce an electric current which is proportionate to the degree of heat. This current is measured by a delicate galvanometer, and the temperature is known thereby. This is simple enough, to be sure, but the difficulty appears when the application is made. In order to protect these fine wires from the action of the melted metal it becomes necessary to enclose them within a tube of iron, porcelain, clay, or plumbago crucible mixture. Iron is scarcely suitable for introduction into the average copper alloys, porcelain is expensive, is easily cracked, and the wires ruined thereby, clay also is subject to the latter difficulty, while plumbago crucible mixture is practically the only covering which is suitable for high melting metals. This, of course, is a poor conductor of heat, and when the working end of the pyrometer is inserted in the metal, a considerable time elapses before the heat penetrates to the wires and the temperature is accurately registered. Unless the proper time elapses before reading the galvanometer, the registered temperature is inaccurate. Our experience has been that a melter will gauge the heat better with his eye than with this form of pyrometer, as he is liable to remove it too soon. This may be a somewhat lame excuse for condemning an accurate instrument, but the casting shop does not appear to obtain good results with laboratory instruments. Even the plumbago tip, too, finally cracks, and if metal alloys with the wires, they are ruined and must be replaced at much expense.

The telescopic type of pyrometer is open to the objection that the true surface of the metal cannot be seen. In melting brass for instance, the glare of the spelter fumes, the incandescence of the charcoal and in other metals, the glow of the oxide, all tend to give abortive readings.

We do not desire to actually condemn the pyrometer for melting, for it has proved an accurate instrument in trained hands, but as an instrument of precision, it appears to be without the province of the average casting shop. The time will come, however, when the problem will be solved and we will be able to use it with the satisfaction that a micrometer or similar instrument is employed. Let us add that, for annealing or heating billets, the pyrometer has already proved its value.

DECISION IN ALUMINUM LITIGATION.

A decision just handed down by the United tSates Court of Appeals upholding the validity of the Bradley patent for reducing aluminum by electricity, is far reaching and of interest to all metal users. It may mean that there will be two manufacturers of aluminum in the United States instead of one as heretofore. The suit was brought by the Electric Smelting and Aluminum Company of Cleveland, Ohio, a company which is closely allied to the Cowles Electric Smelting Company of Lockport, N. Y., against the Pittsburg Reduction Company of Pittsburg, Pa. The latter company, so the court has decided, have been using the Bradley process for some twelve years, and the victory for the Electric Smelting and Aluminum Company includes an accounting of profits for this length of time.

This decision becomes all the more interesting when the fact is taken into consideration that some time ago the Pittsburg Reduction Company brought suit against the Cowles Company for infringment of the Hall process for reducing aluminum owned by the former, and won the case. The reversal has now taken place, although in the lower courts a decision was rendered in favor of the Pittsburg Reduction Company, but was reversed by the Court of Appeals. The decision as it now stands makes the Pittsburg Reduction Company the infringers, and the result will be awaited with interest.

Ladles for use in dipping out aluminum are much more serviceable if made of cast iron rather than the usual wrought iron. The life of a cast iron ladle is very much longer than that of wrought iron, presumably on account of the carbon in the cast iron acting as a protecting covering. Cast iron ladles are now being used extensively for this purpose.

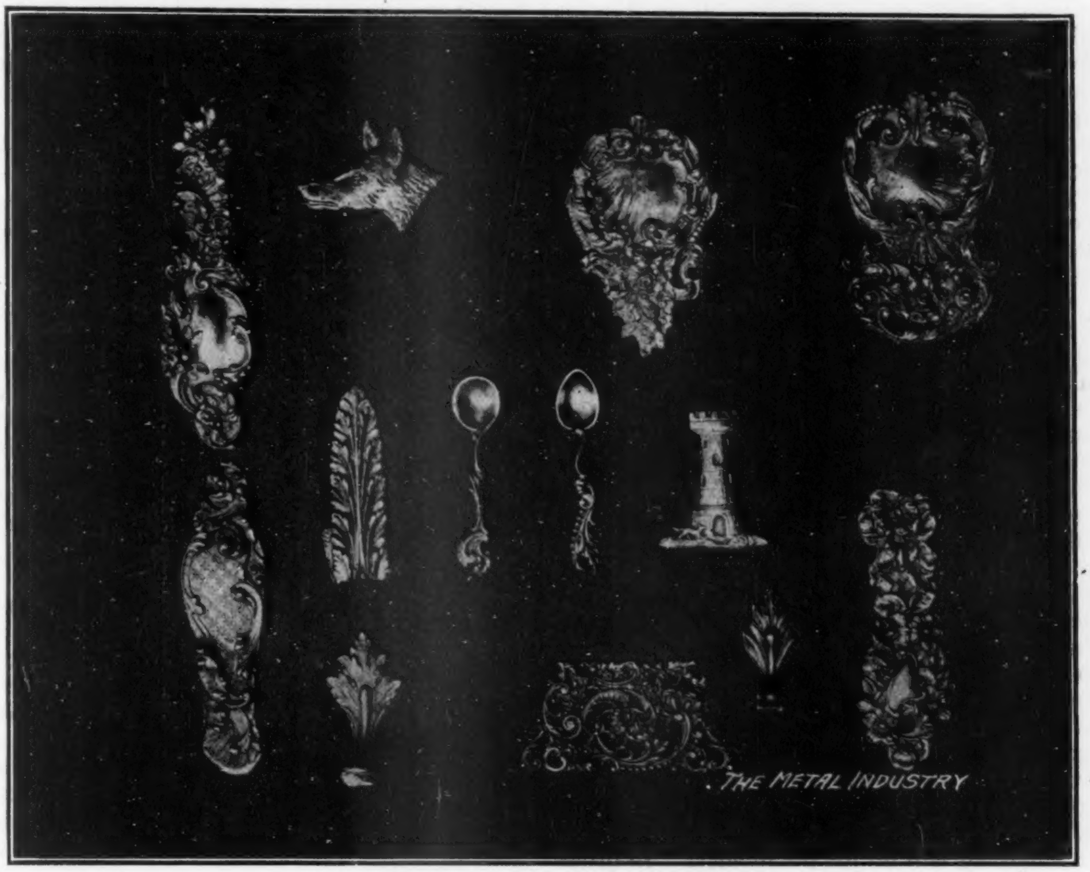
CASTING STERLING SILVER IN SAND.

By D. Charles Machon.

The casting of sterling silver in sand is an operation which is not as difficult as one might imagine. Excellent results are obtained if the proper precautions are taken and the art of molding well understood. Of course the casting in plaster of paris molds (plaster and asbestos) is the most modern method of obtaining good results with sterling silver, but such molds are very difficult to make and obtain satisfactory castings as the most minute details must be tended to. For those who have become experienced in the use of plaster molds, the mixing of asbestos, the drying, and the pouring of the metal, plaster of course gives results not obtainable with sand. With the conditions which exist in small shops or those who only have sterling castings to make now and then, the method to be described will give results closely approaching those obtained with plaster molds.

leveled off and the flask turned over. The cope side of the flask is now placed on and this "rammed" in the manner ordinarily practiced in sand molding.

Now remove the side of the flask first made and face after first spraying it with water. Shake on the facing sand, blowing it off two or three times, so as to drive it well into the corners. Next shake on charcoal facing in the same manner. The best sand for use as facing is usually considered to be Birmingham sand or loam, but other varieties will, of course, answer if they have the requisite property; that is the property of possessing a damp nature as otherwise the charcoal will not adhere to the mold. The object of the sand being shaken on is to fill up all the pores of the mold and then the charcoal gives the smooth surface necessary for the production of a fine casting.



STERLING SILVER SAND CASTINGS.

For making the mold the finest French sand is used. If care is taken the castings produced in this sand will need very little chasing except in the case of work requiring false cores. In these the joints between the core and mold will often require a little "touching up," but ordinarily little of this kind of work is required.

The patterns are first laid out on side of sand commonly called the "odd side" or in reality half a flask "rammed up" with the French sand to be used. This is only a flat surface of sand upon which the patterns are placed. A layer of the sand is now riddled on the patterns using a No. 16 or No. 18 mesh riddle. The mold is now "rammed up," first with the fingers around the patterns and afterwards with the rammer leaving a "mound" of about one-half inch above the level of the iron flask. A mold board is placed on after the sand has been

After the same operation has been gone through with the other side of the mold, the patterns are removed in the usual manner, and the mold is ready for gating. Let me add here that sometimes the cope may be rammed up so as to drive the sand away from the face of the pattern, and then the facings will not touch all over and rough castings are produced. In gating broad shallow gates should be used for light work and thin, narrow ones on heavier ones. I have seen castings run "dull" on account of the gates being too heavy, as the gate robs the castings.

The mold is next dried thoroughly and then smoked, and afterwards closed while warm. I prefer a steam oven for drying instead of the usual core oven, as in the latter great care is required to prevent the heat being too fierce. With the cores used in foundries and made as they ordinarily are with coarse sand, there is little danger from

the ordinary core oven, as the sand is very porous and allows the steam to readily escape. Not so, however, with the French sand which is very compact, and if a fierce heat is used the mold is liable to blister or crack. It may be readily seen, therefore, why I prefer a steam oven for this particular purpose. This suggestion, however, only applies to small molds; if large molds are to be dried, the steam oven is too slow and the usual drying or core oven should be used.

The metal should be melted in crucibles under a covering of charcoal and not allowed to get too hot or to remain too long in the fire. Oftentimes metal will be ready for pouring long before the molds are prepared, and such conditions usually result in poor castings. The best results are obtained when the metal is melted and poured as soon as the proper heat is reached.

A gas furnace is suitable for sterling silver melting and gives good results. Coke and coal, of course, may be used, and much silver is melted by these fuels. Gas, however, offers many advantages, especially with small melts.

The sterling silver is made by taking 92½ parts of the fine silver and 7½ parts of the best shot copper. The two are melted together and covered with charcoal during the process to prevent oxidation. Copper. melts at a higher heat than silver, so care should be taken to see that no lumps remain in the crucible. When everything is melted the whole should be thoroughly stirred, so as to insure mixing. The metal is then ready for pouring.

If the castings come flaky and crack, it shows that the silver was not poured hot enough or was poured too slowly. If, after polishing, the castings are porous (blowholes) it indicates that the metal was overheated. Of course in all branches of sand castings there is more or less trouble experienced from sand holes, but in a great many instances it may be the molder's faults in not thoroughly blowing the sand out of the corners of the mold. Little fine particles are thus left which are washed with the metal, and produce the so called sand holes. Charcoal from the crucible will also cause these holes, and care should be taken to thoroughly skim the crucible full of silver before pouring. Too much charcoal can also be used for facing and will peel off after the mold has been dried and in the case of making fine castings the delicate lines will so become destroyed. Great care is necessary in use of facings to be sure that they are used intelligently. I have used soapstone, lampblack, plumbago and several other facings, but am fully convinced that charcoal is far superior to them all.

A great many times poor or rough castings are due to the pattern. No doubt the reader has often heard the remark that "anything will do for the molder." In order to make good castings it is necessary that good paterns should be supplied. A good "draw" is the most essential feature, as if any tearing of the mold occurs during the removal of the patterns rough work follows. The surface of the patterns should also be very smooth, as the least roughness left on the pattern will show on the casting on account of the fineness of the French sand.

Some silversmiths say that they prefer sterling silver sand castings to those cast in plaster of paris molds, as they seem to work more easily, and are less liable to crack. They also say that the castings are more pliable with proper patterns, sterling silver castings may be made in sand which will need very little "chasing" and only need to have the "matting" put on.

Like all other trades much depends on the mechanic, but fine castings may be made by the sand method, with less liability of pin holes, as there is no gas to escape after the mold is dried, except a little which escapes through the gate venting, therefore is not needed. Some sterling silver castings made in the above manner are herewith reproduced from an actual photograph.

In conclusion it may be said that this process is equally applicable to bronze or brass. In the silver industry brass castings are used for a base for plating and just as good work is required as in the case of sterling silver.

IRIDIUM—ITS PROPERTIES AND USES.

Iridium is a metal with which nearly everyone is familand does not know it. Carefully examine the point of a gold pen, particularly with the aid of a magnifying glass, and two small, white lumps will be seen which resist the action of a file; without them the pen would be useless. Gold is a soft metal and entirely unsuited for use as a pen, except on account of its non-corrosiveness, but the use of the hard iridium on the points renders the use of this metal possible.

Iridium possesses the property of being the hardest known metal, and as such it is employed on the points of gold pens to render them durable and capable of holding the point. It is a white metal and lacks only a small amount of being the heaviest known metal. Osmium, a metal somewhat resembling it in appearance, possesses a specific gravity of 22.47, while iridium has 22.40. Iridium is nearly 20 per cent heavier than gold and is somewhat heavier than platinum. It is infusible at even a white heat, but may be melted by means of the electric furnace. Iridium is not a recently discovered metal, but has been known since 1804, and is found in nature associated with platinum, osmium, rhodium and ruthenium in a mineral called iridosmine.

Iridium is as non-corrosive as platinum and gold, and having the property of being as hard as tempered steel and, at the same time, practically infusible would be an exceedingly useful metal did not its cost preclude an extensive use. Its cost at the present time is about $30.00 per troy ounce.

In addition to its use on gold pens, iridium is used to harden platinum, a somewhat soft metal. An addition of a few per cent. of iridium to platinum renders the latter hard and stiff acting in the same manner as tin when added to brass or copper. Until this fact was discovered a stiff platinum sheet or wire could not be made.

Iridium is attached to gold pens by means of silver solder and ground to a finish with diamond dust. The annual consumption of iridium in the United States for pen points is said to be only about 30 ounces.

ROLLING MILL "PAY DIRT."

The care with which the brass rolling mill industry is now conducted, and the means taken to prevent wastes which in former times were considered too small to be worth recognizing, has recently been demonstrated in the case of a Naugatuck valley brass and copper mill. This mill was formerly run with a water wheel, and a tail race runs under the shop from the reservoir back of it. In this particular mill copper has been rolled hot. The tail race having become more or less filled up, a gang of men were set to work cleaning it out, and it was found that the mud actually was "pay dirt." That nearest the wheel pit assayed 80 per cent. of copper, which renders the material worth in the neighborhood of ten cents per pound. Such "mines," however, do not yield long, but are satisfactory as long as they do.

INFLUENCE OF CASTING TEMPERATURE ON THE PROPERTIES OF METALS.

It is a well known fact that the casting temperature of metals and alloys has a direct bearing on their properties. P. Longmuir* has recently made some experiments in this direction and arrived at the following results. The experiments were made on large amounts of metal, so as to obtain normal foundry conditions. Specimens of gun-metal, red brass, Muntz metal, yellow brass, cast iron, and malleable iron were used. Three sets of bars from each alloy or metal were cast at different temperatures, viz: (1) At a very high temperature; (2) at a temperature which, in the author's estimation, represented a fair heat; (3) at the lowest temperature at which the metal would flow. When this was done it was found that, viz:

1. Castings poured at the medium heat or normal casting temperature had in all the metals and alloys, more strength, ductility, and contraction of area, than those poured at either the high or low temperatures.
2. The gun-metal and Muntz metal alloys cast at the lower temperature were superior, with regard to mechanical properties, to the same alloys cast at a high temperature.
3. The red and yellow brasses cast at a low temperature were mechanically inferior to those cast at a high temperature.
4. The influence of the casting temperature was especially marked in the case of gun-metal and red brass alloys.

The examination of the micro-structure of the alloys showed that high temperatures favor a large though not well developed type of crystallization. In the low temperature castings the type of crystallization is more distinct, the crystal junctions being very sharply defined, and, apparently, forming routes along which fracture readily travels. In the alloys poured at a normal casting heat, the type of crystallization is still distinct, but is marked by the manner in which the crystals are interlocked.

In discussing the practical application of the results obtained, the author points out that the most suitable casting temperature is determined by a variety of causes, namely the external and internal form, variations in the thickness of the section, especially abrupt changes from thin to thick metal, etc. The temperature at which the metal enters the mold is influenced by the rate of pouring, the form of runner and gate and the distance traveled by the metal before entering the mold. In judging for the best temperature for casting, much assistance may be derived from a comparison of the mechanical properties of the cold casting with the appearance of the metal as it left the ladle and also from the appearance of the runner heads.

Liquation is the term used to designate the separation of one alloy from another while the metal is cooling. For instance, a copper and tin alloy will "sweat" small drops at the gate or top of riser. This phenomenon is called liquation, and the common term is "sweating."

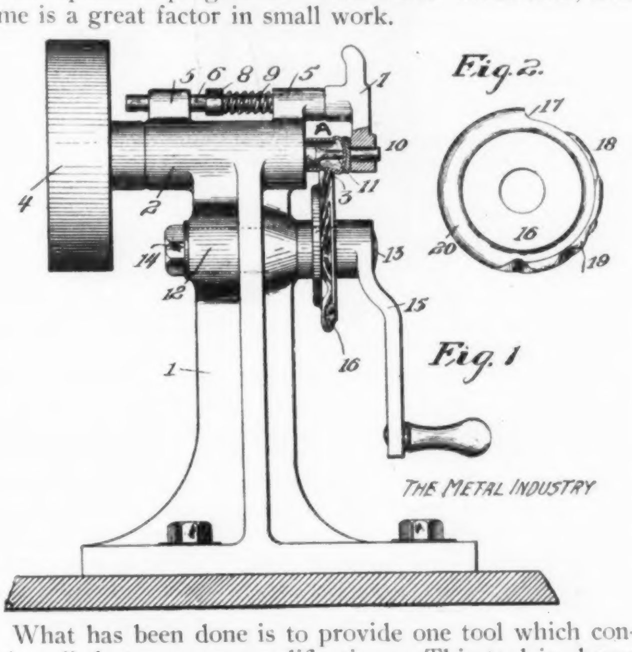
If difficulty is experienced in casting the alloys of aluminum and zinc, try those of aluminum and copper. The alloys of aluminum and zinc show a great tendency to crack, and this feature is not manifested by those of aluminum and copper.

*Iron and Steel Inst., August, 1903.

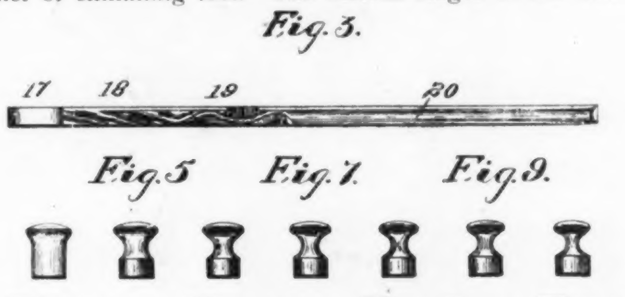
A NEW FORM OF SPINNING LATHE.

Very little improvement has been made in the method of spinning metals up to the present time. The method pursued is practically the same as that practiced in the early days of the industry. The process is essentially a hand one, and skilled labor has been required in carrying out the operation.

An improvement in spinning sheet metals has recently been made by Mr. John Kirschbaum, Superintendent of the Novelty Manufacturing Co., of Waterbury, Conn., which for work of certain kinds, and in cases where many pieces of one kind are desired, is a marked advance in the method of spinning sheet metals. In the ordinary spinning lathe the operator is obliged to change the tool as the operation progresses. This wastes much time, and time is a great factor in small work.



What has been done is to provide one tool which contains all the necessary modifications. This tool is shown in Fig. 1, having the handle for the operator attached to it. In Fig. 2 the tool is again shown, and it will be seen that it is disc shaped. In Fig. 3 the periphery of the wheel is shown. To operate it one modification after the other is applied to the work A (Fig. 1). First the forming side is applied. Then turning the handle slightly another change in tool is produced, and so on through the burnisher or skimming tool. The various stages of the work



are shown in Figs. 4 to 10. The work is held by an ingenious spring device 1 (Fig. 1).

This machine is particularly applicable to the manufacture of ferrules, buttons, and similar small work, and enables the operator to turn out many more pieces per day than could be done had he to frequently change the tool.

AN IMPROVEMENT IN METAL SAWS.

Nearly every metal working company uses a metal saw; it is practically the only way sheet can be slit without mashing down the edge, or rods and tubing cut to length. Users are realizing that sawed metal is more economical to use than sheared, and any improvement in metal saws should be welcomed.

FIG. 1.

P. Pryibil, of 512 West 41st street, New York, has brought out a saw which is a radical departure from the usual type. The old method has been to lubricate the saw from a can overhead. Mr. Pryibil runs the saw in a bath of lubricant and, at the same time, passes the saw through two brushes which remove the surplus oil and simultaneously brushes off any adhering chips or dust from the metal. The trough in which the saw runs also keeps the saw cool, a great desideratum. When the lubricant becomes foul or thick it may be removed by a plug in the bottom.

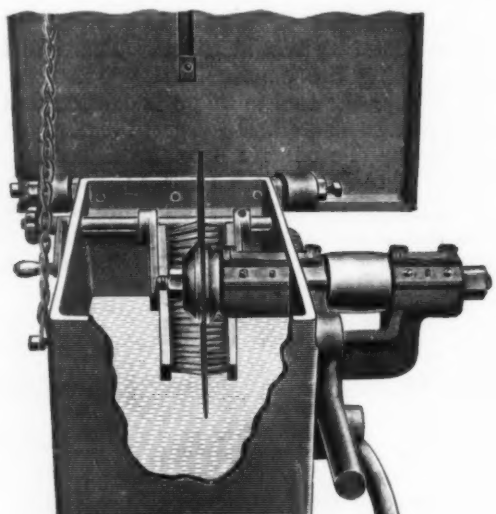


FIG 2.

This saw may be used with water or any other liquid, and is applicable for cutting brass, copper, silver, aluminum, German silver, ivory, horn, and any material which can be sawed at all. It certainly commends itself to anyone who desires a modern tool. In Fig. 1 the saw and table is shown, while in Fig. 2 is illustrated the manner in which the saw is run through the brushes and trough of lubricant.

THE SUCCESS OF EMERY IN GLUED WHEELS.

Although the more recent abrasives, corundum and carborundum, have, on account of their superior hardness, replaced emery to a large extent, there is one use in which emery appears to have held its own—that is the making of glued wheels.

When the finer grades of abrasives are used for polishing, it is customary to employ glued wheels instead of solid ones. The emery is glued to wood, leather or equivalent material. When worn off another coating is applied. There are certain advantages of a glued wheel, and for that reason it is quite extensively used. The wheel, if made of wood, is first turned up true and a coating of hot glue applied. The emery is then dusted over and the glue allowed to set. A second coating of glue is now applied and the process repeated. After the requisite thickness of emery has now been applied the wheel is allowed to remain until perfectly dry.

Of course, the emery wears off after a time, but when corundum or carborundum are used the life is very much shorter, and oftentimes, instead of wearing away evenly, the abrasive is removed in spots. With emery the wear is evenly distributed. Those who have used a glued corundum or carborundum wheel are profuse in their praise of its cutting qualities, and in several instances we have known of three times the output being done on a carborundum wheel. It may be seen, accordingly, that the extra cost of these abrasives is much more than compensated for by the extra work produced. The cutting, however, was discovered to be short lived, as the abrasives, as above mentioned, were removed from the wheel, so that little or no cutting followed.

Various manufacturers who do polishing arrived at the conclusion that emery was more satisfactory for this particular work, but as far as we are able to learn no explanation followed. The reason is this: If a particle or grain of emery be examined under a lens or a larger one by the naked eye, it will be found to possess a cellular or spongy nature and resembling, perhaps, more than anything else a piece of pumice stone. When glued to a wheel, the glue penetrates the cavities and holds the grain in place in a tenacious manner. The particle of corundum or carborundum is of a different nature. Here we have a hard, glassy surface, to which the glue does not appear to hold as well as it does to emery; hence the rapid removal of the abrasive surface from the wheel.

We do not desire the reader to fancy that the use of corundum or carborundum on a glued wheel is an impossibility, for such is not the case. We know of several concerns who use these abrasives successfully and continuously on a glued wheel and strapping belt with excellent results, but as yet their secret of gluing is unknown. The whole question appears to be to obtain a binding material which will adhere to the glossy grains instead of flaking off when dry, and as soon as this is found the difficulty attending the use of glued wheels will disappear. The question appears to us somewhat like the problem of sticking labels to tin boxes and cans. Certain adhesives utterly fail to do the work, but the proper kind renders the matter quite simple.

The Ferracute Machine Company, of Bridgeton, N. J., whose plant was destroyed by fire, are building a temporary shop 50 x 100, and have rented another building somewhat smaller in size. Later on the company will build larger works.

The Magnolia Metal Company, of New York, have moved back to their old factory at 113 Bank street, which was destroyed by fire about a year ago, and which has been rebuilt.

ELECTROLYTIC LEAD-REFINING.

By Anson G. Betts, Troy, N. Y.*

A solution of lead-fluosilicate, containing an excess of fluosilicic acid, has been found to work very satisfactorily as an electrolyte for refining lead. It conducts the current well, is easily handled and stored, non-volatile and stable under electrolysis, may be made to contain a considerable amount of dissolved lead, and is easily prepared from inexpensive materials. It possesses, however, in common with other lead electrolytes, the defect of yielding a deposit of lead lacking in solidity, which grows in crystalline branches toward the anodes, causing short circuits. But if a reducing action (practically accomplished by the addition of gelatine or glue) be given to the solution, a perfectly solid and dense deposit is obtained, having very nearly the same structure as electrolytically deposited copper, and a specific gravity of about 11.36—that of cast lead.

My first experiments were carried out without the addition of gelatine to the fluosilicate solution. The lead deposit consisted of more or less separate crystals that grew toward the anode, and, finally, caused short-circuits. The cathodes, which were sheet-iron plates, lead-plated and paraffined, had to be removed periodically from the tanks and passed through rolls, to pack down the lead. When gelatine has been added in small quantities, the density of the lead is greater than can be produced by rolling the crystalline deposit, unless great pressure is used.

The Canadian Smelting Works, Trail, British Columbia, have installed a refinery, making use of this process. There are 28 refining tanks, each 86 inches long, 30 inches wide and 42 inches deep, and each receiving 22 anodes of lead bullion with an area of 26 by 33 inches exposed to the electrolyte on each side and 23 cathodes of sheet lead, about 1-16 inch thick, prepared by deposition on lead-plated and paraffined iron cathodes. The cathodes are suspended from 0.5 by 1 inch copper bars, resting crosswise on the sides of the tanks. The experiment has been thoroughly tried of using iron sheets to receive a deposit thicker than 1-16 inch; that is, suitable for direct melting without the necessity of increasing its weight by further deposition as an independent cathode; but the iron sheets are expensive and are slowly pitted by the action of the acid solution, and the lead deposits thus obtained are much less smooth and pure than those on lead sheets.

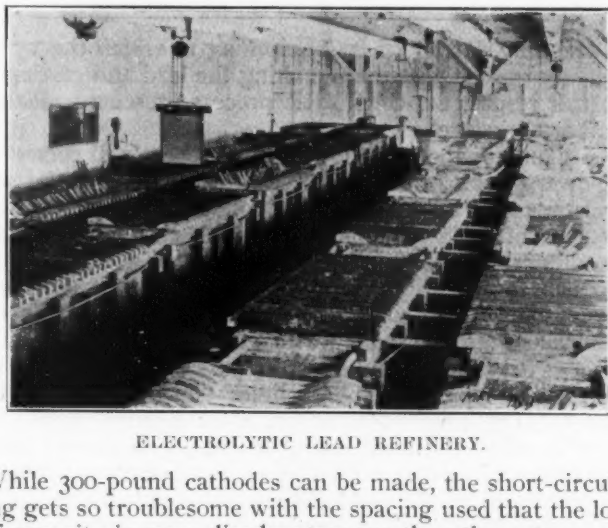
The smoothness and the purity of the deposited lead are proportional. Most of the impurity seems to be introduced mechanically through the attachment of floating particles of slime to irregularities on the cathodes. The effect of roughness is cumulative; it is often observed that particles of slime attract an undue amount of current, resulting in the lumps seen on the cathodes. Samples taken at the same time showed from 1 to 2.5 oz. silver per ton in rough pieces from the iron cathodes, 0.25 oz. as an average for the lead sheet cathodes, and only 0.04 oz. in samples selected for their smoothness. The variation in the amount of silver (which is determined frequently) in the samples of refined lead is attributed not to the greater or less turbidity of the electrolyte at different times, but to the employment of new men in the refinery, who require some experience before they remove cathodes without detaching some slime from the neighboring anodes.

Hydrofluoric acid of 35 per cent., used as starting material for the preparation of the electrolyte, is run by gravity through a series of tanks for conversion into lead fluosilicate. In the top tank is a layer of quartz 2 feet thick, in passing through which the hydrofluoric acid dissolves silica, forming fluosilicic acid. White lead (lead carbonate) in the required quantity is added in the next tank, where it dissolves readily and completely with effervescence. All sulphuric acid and any hydrofluoric acid that may not have reacted with silica settle out in combination with lead as lead sulphate and lead fluoride. Lead fluosilicate is one of the most soluble of salts; so there is never any danger of its crystallizing out at any degree of concentration possible under this method. The lead solution is then filtered and run by gravity into the refining tanks.

The solution originally used at Train contained about 6 per cent. of lead and 15 per cent. of silica fluoride.

It is very necessary to have adequate apparatus for washing solution out of slime. The filter first used consisted of a supported filtering cloth with suction underneath. It was very difficult to get this to do satisfactory work by reason of the large amount of fluosilicate to be washed out with only a limited amount of water. At the present time the slime is first stirred up with the ordinary electrolyte several times and allowed to settle before starting to wash with water at all. The Trail plant produces daily 8 or 10 cubic feet of anode residue, of which over 90 per cent. by volume is solution. The evaporation from the total tank surface of something like 400 square feet is only about 15 cubic feet daily; so that only a limited amount of wash water is to be used—namely, enough to replace the evaporated water, plus the volume of the slime taken out.

The tanks are made of 2-inch cedar, bolted together and thoroughly painted with rubber paint. Any leaks are caught underneath on sloping boards. Solution is circulated from one tank to another by gravity and is pumped from the lowest to the highest by means of a wooden pump. The 22 anodes in each tank together weigh about three tons and dissolve in from eight to ten days, two sets of cathodes usually being used with each set of anodes.



ELECTROLYTIC LEAD REFINERY.

While 300-pound cathodes can be made, the short-circuiting gets so troublesome with the spacing used that the loss of capacity is more disadvantageous than the extra work of putting in and taking out more plates. The lead sheets used for cathodes are made by depositing about 1-16 inch metal on paraffined steel sheets in four of the tanks, which are different from the others only in being a little deeper.

The anodes may contain any or all of the elements—gold, silver, copper, tin, antimony, arsenic, bismuth, cadmium, zinc, iron, nickel, cobalt and sulphur. It would be expected that gold, silver, copper, antimony, arsenic and bismuth, being more electronegative than lead, would remain in the slime in the metallic state, with, perhaps, tin,

*Trans. Am. Inst. Mining Eng., Albany meeting, February, 1903.

while iron, zinc, nickel and cobalt would dissolve. It appears that tin stands in the same relation to lead that nickel does to iron; that is, they have about the same electromotive forces of solution, with the consequence that they can behave as one metal and dissolve and deposit together. Iron, contrary to expectation, dissolves only slightly, while the slime will carry about 1 per cent. of it. It appears from this that the iron exists in the lead in the form of matte. Arsenic, antimony, bismuth and copper have electromotive forces of solution more than 0.3 volt below that of lead. As there is no chance that any particle of one of these impurities will have an electric potential of 0.3 volt above that of the lead with which it is in metallic contact, there is no chance that they will be dissolved by the action of the current. The same is even more certainly true of silver and gold. The behavior of bismuth is interesting and satisfactory. It is as completely removed by this process of refining as antimony is. No other process of refining lead will remove this objectionable impurity so completely. Tin has been found in the refined lead to the extent of 0.02 to 0.03 per cent. This we had no difficulty in removing from the lead by poling before casting. There is always a certain amount of dross formed in melting down the cathodes, and the lead oxide of this reacts with the tin in the lead at a comparatively low temperature.

The extra amount of dross formed in poling is small, and amounts to less than 1 per cent. of the lead. The dross carries more antimony and arsenic than the lead, as well as all the tin. The total amount of dross formed is about 4 per cent. Table I shows its composition.

TABLE I.—*Analyses of Dross.*

Analyses of the lead from which this dross was taken, see Table II.

No.	No. in Table II.	Cu. Per Cent.	As. Per Cent.	Sb. Per Cent.	Fe. Per Cent.	Zn.
1	2	0.0005	0.0003	0.0016	0.0016	none
2	[illegible]	0.0010	0.0008	0.0107	0.0011	"

The only danger of lead-poisoning to which the workmen are exposed occurs in melting the lead and casting it. In this respect the electrolytic process presents a distinct sanitary advance.

A plant for the operation of this process will consist of a power plant, furnishing an electrolyzing current of several thousand amperes, with a voltage depending on the number of tanks; a tank house, with electric cranes for handling a tank load of anodes or cathodes at once; apparatus for making "starting" cathodes of sheet lead, preferably of lead cut from sheets rolled at the refinery; pumps and storage tanks for handling the electrolyte, and a cellar beneath the tanks for the passage of tank cars removing that part of anode slimes which falls from the plates. The finished cathodes, after rinsing, would be carried off to the lead-casting kettle. The casting room would contain either a rotating or belt conveyor for passing the open anode molds beneath the end of the siphon through which lead is flowing from the bullion kettle. The bars of lead would be molded, as is usually done in refining works, by siphoning into a semi-circular row of molds. There would be either a washing, drying and sampling plant for the slime, in case it is sold, or a reduction mill, if it is worked into bullion. The latter is much the best, if the location of the plant is not so remote that the express charges on the bullion will balance the saving.

For the treatment of slime, the only method in general use consists in suspending the slime in a solution capable of dissolving the impurities and supplying, by a jet of steam and air forced into the solution, the air necessary for its reaction with, and solution of, such an inactive metal as copper. After the impurities have been mostly dissolved, the slime is filtered off, dried and melted, under such fluxes as soda, to a doré bullion.

The amount of power required is calculated thus: Five amperes in 24 hours make 1 pound of lead per tank; one ton of lead equals 10,000 ampere days, and at 0.35 volts per tank, 3,500 watt days, or 4.7 E. H. P. days. Allowing 10 per cent. loss of efficiency in the tanks (we always get less lead than the current which is passing would indicate), and of 8 per cent. loss in the generator increases this to about 5.6 H. P. days, and a further allowance for the electric lights and other applications gives from 7 to 8 H. P. days as about the amount per ton of lead. At $30 per year, this item of cost is something like 65 cents per ton of lead. So this is an electro-chemical process not especially favored by water power.

More important, however, is the greater saving of the metal values by reason of increased yields of gold, silver, lead, antimony and bismuth and the freedom of the refined lead from bismuth.

Tables II, III and IV show the composition of bullion, slimes and refined lead.

TABLE II.—*Analyses of Bullion.*

No.	Fe. Per Cent.	Cu. Per Cent.	Sb. Per Cent.	Sn. Per Cent.	As. Per Cent.	Ag. Per Cent.	Au. Per Cent.	Pb. Per Cent.	Ag. Oz. p. T.	Au. Oz. p. T.
1	0.0075	0.1700	0.5400	0.0118	0.1460	1.0962	0.0085	98.0200	319.7	2.49
2	0.0115	0.1500	0.6100	0.0158	0.0960	1.2014	0.0086	97.9068	350.4	2.52
3	0.0070	0.1600	0.4000	0.0474	0.1330	1.0738	0.0123	98.1665	313.2	3.6

TABLE III.—*Analyses of Slimes.*

Fe. Per Ct.	Cu. Per Ct.	Sb. Per Ct.	Sn. Per Ct.	As. Per Ct.	Pb.	Zn.	Bi.
1.27	**8.83**	**27.10**	**12.42**	**28.15**	**17.05**	**none**	**none**
1.12	**22.36**	**21.16**	**5.40**	**23.05**	**10.62**	**"**	**"**

TABLE IV.—*Analyses of Refined Lead.*

No.	Cu. Per Cent.	As. Per Cent.	Sb. Per Cent.	Fe. Per Cent.	Zn Per Cent.	Sn. Per Cent.	Ag. Oz. p. T.	Ni,Co,Cd. Per Cent.	Bi. Per Cent.
1	0.0006	0.0008	0.0005	....	....	....	....	....	....
2	0.0003	0.0002	0.0010	0.0010	none	....	....	....	....
3	0.0009	0.0001	0.0009	0.0008	"	....	0.24	....	....
4	0.0016	....	0.0017	0.0014	....	....	0.47	none	....
5	0.0003	....	0.0060	0.0003	....	....	0.22		....
6	0.0020	....	0.0010	0.0046	....	....	0.22	none	....
7	0.0004	none	0.0066	0.0013	none	0.0035	0.14	....	....
8	0.0004	....	0.0038	0.0004	"	0.0035	0.25	....	....
9	0.0005	....	0.0052	0.0004	"	0.0039	0.28	....	....
10	0.0003	none	0.0060	0.0003	"	0.0049	0.43	....	....

The success thus attained in the electrolysis of lead, generally accepted hitherto as impracticable, may give some encouragement to the employment of similar methods in the treatment of some of the other metals, especially as it is shown to be possible to apply simple means to obviate the chief trouble, spongy deposits.

H. Kramer & Son, of Chicago, metal refiners and dealers in drosses, skimmings and scrap metal, have opened a branch house in Milwaukee, at the corner of Clinton and Lake streets.

All of the brass factories of Rome, N. Y., are running to their full capacity to keep pace with orders. There are located in Rome two sheet rolling mills, one tube mill, two wire drawing mills and two manufacturers of brass and copper goods. All are large concerns.

THE REMOVAL OF NICKEL COATING FROM IRON

By C. F. Burgess

An operation frequently found necessary in an electroplating plant is the removal of a nickel coating which has been deposited upon an iron surface. The necessity for such an operation arises in the re-nickeling of old work and of work in which the nickel coating has been found defective, either by the deposit being burned or by lack of proper adherence which causes part of the coating to be removed in the polishing or other subsequent processes. It is difficult to deposit an adherent coating of nickel upon a nickel surface which has been exposed to the air for some time, but it is possible to do so if the greatest care is exercised in preparing and cleaning the surface.

The common method of removing a nickel coating is by grinding on an emery wheel, the disadvantage of which is that considerable labor is thus involved, since the surface must be again polished before receiving a subsequent coating. The following observations were made as a result of some investigations to determine whether an electrolytic, or chemical "stripping" method, might not be employed to overcome these objections.

The stripping of nickel from iron is rendered somewhat difficult from the fact that nickel and iron are similar in their chemical and electrochemical behavior and there are therefore few solutions which will not disolve the iron as well as the nickel. A coating of zinc or other similar metal which is more electropositive than iron may be readily stripped from an iron surface without damage to the iron. It has been found that copper or brass may be removed from iron, even though electronegative to it, by suspending it as an anode in suitable electrolytes and utilizing that property of iron which renders its surface "passive" or electronegative. Iron which has become passive acts very much like platinum in resisting the corroding action at the anode. Solutions which will develop this electronegative condition in iron include sodium and potassium nitrate, other soluble nitrate salts, and similar chromate or bichromate solutions. By utilizing this property the removal of superfluous brass from bicycle frames and other brazed work is practiced exclusively by suspending the work as the anode in sodium nitrate solutions.

Upon attempting to use the same method for the removal of nickel it was found that nickel, as well as iron, assumes the "passive" condition and therefore is not soluble. It apparently becomes covered by a resistant black oxide coating, which prevents the anode products from dissolving the nickel.

A rather peculiar and unexpected condition developed, however, which made it possible to remove the nickel, not by dissolving, but by loosening it in such a manner that it could be readily detached in a continuous sheet. A nickel coating is always porous to a certain extent and the oxygen which is liberated at the anode seems to penetrate through it, causing the adherence between the nickel and the iron to be destroyed, and accumulating under the nickel in such a manner as to force it away from the iron surface. After subjecting a nickeled surface to the action of a sodium nitrate solution, using a current density of about 30 amperes per square foot, for a period of from one-half to one hour, the surface presented a marked blistered appearance and the nickel could be stripped off in the form of a thin sheet, leaving the iron in a condition similar to that existing before the nickel coating was applied.

Similar trials with a chromate solution failed to produce this effect in so marked a degree, the coating becoming superficially oxidized, but failing to become detached from the iron unless subjected to the operation for several hours.

The sodium nitrate solution which might be most suitable for the operation of such a process would consist of about one pound of sodium nitrate of the ordinary commercial grade, which is practically free of sodium chloride or other chloride salts. This solution possesses good conductivity. The necessary electromotive force is about four or five volts, such as is furnished by an ordinary electroplating dynamo. The cathodes could consist of some cheap metal. Iron would be suitable, though in course of time it would become rusted owing to the action of the ammonia, which is formed at the cathode during electrolysis of a nitrate solution. Sheet copper cathodes would not be subject to this action.

To operate this solution in such a manner that the iron anode will not corrode or rust it is necessary that the solution be kept neutral, or preferably slightly acid. The solution has a tendency to become gradually alkaline, this being due to the reducing action of the cathode products upon the dissolved salts, and it is therefore necessary to neutralize this tendency by an occasional addition of a small amount of nitric acid. Litmus paper may be used to indicate the condition of the solution, the acid being slowly added to the solution until blue litmus paper dipped in the electrolyte shows a red tint.

Whether this method for detaching nickel coatings can be applied industrially with advantage can be determined only by more extensive trial than has been given in our laboratory, but inasmuch as one hour's manual labor is equivalent to a number of horse-power hours when expressed in dollars and cents, it is entirely possible that a saving might be effected.

In just what manner the adherence between nickel and iron is destroyed without injuring either metal does not seem quite clear and might serve as an interesting subject for investigation.

It was found that the adherence could be destroyed whether the nickel had been deposited directly upon the iron or an intermediate coating of copper had been employed. In the latter case the copper was dissolved out almost completely.

Laboratory of Applied Electrochemistry,
University of Wisconsin.

COMPOUND FOR USE IN TINNING BATHS.

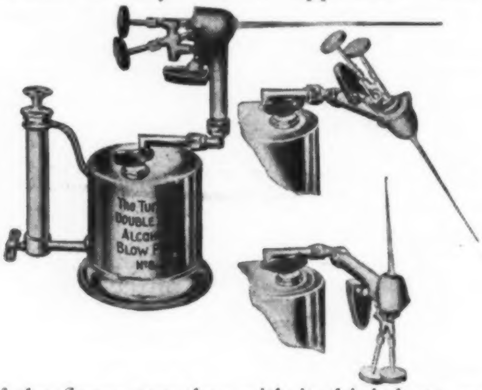
A new compound for use in tinning has been discovered by Arthur W. Burwell, of Cleveland, O., which is said to give much more satisfactory and lasting results than the usual palm oils. A good oil for use in tinning should have a boiling point above that of molten tin. This compound is said to possess such a property. Mr. Burwell states that it is "a combined fluxing and lustre oil," so that not only will the tin adhere better than with other oils, but the lustre is greatly increased. To make his compound he takes any mineral oil having a boiling point above that of molten tin—such for instance as a good quality of "cylinder stock," which has a specific gravity of 30 degrees Baumé or below—and mixes with oleic acid in the proportion of 2 parts of "cylinder stock" with 1 part of oleic acid.

By new process the Zucker & Levett & Loeb Company, of New York, announce that they make nickel anodes almost entirely free from carbon.

A HIGH TEMPERATURE BLOWPIPE.

Many operations, such as lead burning or blowpipe soldering, require a very high temperature, with a sharp pointed flame. Heretofore such temperatures could only be obtained with the oxyhydrogen blowpipe or by the use of hydrogen alone, both of which are expensive and difficult to use.

The Turner Brass Works, of Chicago, Ill., have solved this problem by introducing their "Double Jet Alcohol Blowpipe." This blowpipe burns wood alcohol, and probably gives the nearest approach to the oxyhydrogen flame of any known appliance. The needle



shape of the flame, together with its high heat, renders it particularly suitable for lead burning, such as the joining of sheet lead for pickle tanks. For soldering or brazing no argument is needed to show its adaptability to the work. Anything in the metal line may be melted, copper, silver, gold and even 50 per cent. platinum solder. The flame is non-oxidizing, and as no bellows is required, as is the case with the ordinary gas blowpipe, it should readily commend itself to manufacturing jewelers, brass manufacturers, and silversmiths; all would find it a valuable and useful tool.

THE BRASS MANUFACTURERS' ASSOCIATION.

The Brass Manufacturers' Association of the United States, will hold its annual meeting on Tuesday, December 8th, at the offices of the association, Schiller Building, Chicago. The general purpose and object of the association is for obtaining a closer union between the people engaged in the brass industry, particularly the manufacturers of brass goods in steam, water and gas. The association collects and distributes information of general interest to the trade, and in a general way adjusts slow or bad accounts, and aims to protect its members from the encroachment of outside competition and to maintain the wage scale generally, and protect its members in case of loss or disaster of any kind, including strike or labor troubles. Commissioner William M. Webster reports that the association's membership is constantly growing.

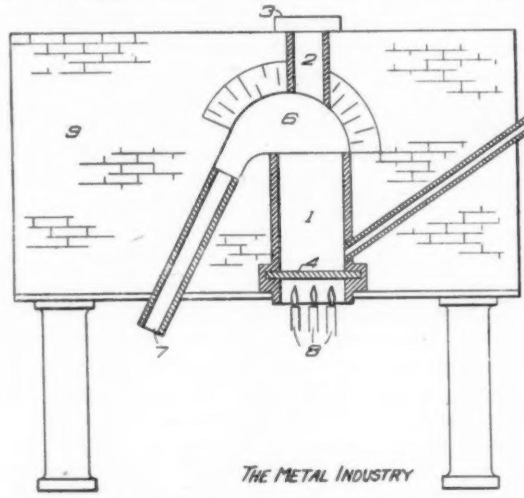
The S. Obermayer Company has just issued the first number of volume 2 of the Obermayer Bulletin. The first birthday of the Bulletin and the thirtieth birthday of the S. Obermayer Company are celebrated in the same issue. Naturally the anniversary is celebrated in the Bulletin by a description of the officers and plants of the S. Obermayer Company, with portraits and half-tone illustrations. The Obermayer Bulletin is issued from the Detroit office of the S. Obermayer Company, and contains foundry information for molders.

The Gulf, Colorado and Sante Fe Railway Company are making improvements in their brass foundry at Cleburne, Tex.

NEW PROCESS FOR SMELTING ALUMINUM.

A new process for smelting aluminum has been patented by Arvid Reuterdahl, of Providence, R. I., in which the reduction of alumina by means of a hydrocarbon gas is claimed.

Finely powdered alumina is mixed into a paste with oil of turpentine or benzine. This paste is then let into



the retort 1 as shown in the sketch, and acetylene gas is passed into the retort by means of the tube 5. The products of combustion pass out of the outlet 7. The heat necessary for the reduction is maintained by the suitable forms of oxyhydrogen blowpipes 8. To help draw the acetylene gas through the mass, a vacuum is maintained by attaching a pump at 7. The general arrangement of the furnace and retort is shown in the sketch herewith illustrated.

(The use of oxyhydrogen blowpipe in connection with this process would appear to preclude the fact that aluminum could be made at a cost even approximating the present price. A more expensive fuel could scarcely be obtained. EDITOR.)

The brass foundry business of F. J. Phillips, and the Illinois Brass Foundry Company have been consolidated, under the name of Illinois Brass Foundry Company, with F. J. Phillips as general manager. The firm is making a number of substantial improvements in the way of new machinery and appliances to their plant at 99 Bunker street, Chicago.

The factory buildings of the Marion Insulated Wire and Rubber Company, Marion, Ind., are now ready for roofing. All heavy machinery on the first floor will be driven from line shafting, while the elevators and all machinery on the second and third floors will be operated by electricity.

The Crandall Cutlery Company was chartered recently for the purpose of manufacturing and dealing in cutlery with a capital stock of $35,000. The company is now building a two-story brick factory at Bradford, Pa. H. E. Crandall is president and general manager, and F. A. Ansell, superintendent.

The Ideal Register and Metallic Furniture Company, of Detroit, Mich., has recently organized with a capital stock of $25,000, and has absorbed the business of the American Metallic Furniture Company, also of Detroit. The new company will continue the manufacture of a special line of metal hat racks, umbrella stands, and various other articles in the line of metal furniture.

CORRESPONDENCE DEPARTMENT

In this Department we will answer any question relating to the non-ferrous metals and alloys. Address THE METAL INDUSTRY, 61 Beekman St., New York

Q.—Will you give me your opinion as to which is the most economical, a lined car brass or a solid brass bearing, the latter being made from copper 80, tin 10 and lead 10. I mean by this the most economical to the consumer, the difference in price being about five cents per pound.

A.—The lined car brass is the more economical, as it avoids the expensive machine work which is necessary on a unlined brass to obtain a perfect seat for the axle. It is difficult in an unlined journal to obtain a perfect fit without very careful machine work and adapting the brass to each individual axle. Axles vary in size, not materially, of course, but enough to render the fitting of a standard box uncertain. Again an axle may have begun cutting and so become somewhat smaller in diameter. An unlined brass, then, unless made carefully for the axle it is to fit, may only bear on one point and until the axle has worn down to a seat heating occurs. With a journal lined with antimonial lead, or the standard car brass, the soft nature of the lining allows the axle to take a seat at once. Of course this reasoning bears only on freight or passenger car brasses where a stock of brasses is held by the railroad, and when one is needed it is slipped in without any machine work at all. Were it necessary to machine each freight car box before putting in matters would be somewhat complicated. Theoretically the situation would be satisfactory, but the conditions are such that brasses that would fit cannot be made for stock unless lead lined.

As for the driving boxes for locomotives, unlined brasses are used on the best managed railroads and are machined with great care to fit each individual axle.

The most satisfactory freight car brass would be one made from the best possible mixture and lead lined, as, after portions of the lead had worn away, a backing of good bearing metal would be exposed.

Q.—What will prevent a babbitt metal from tarnishing when exposed to air. If there is anything which will serve this end, will it effect the wearing qualities of the babbitt metal.

A.—It is the copper which gives babbitt metal the property of tarnishing upon exposure to the atmosphere, and neither tin nor antimony tarnish at all. If, therefore, copper is left out of the mixture an alloy of a non-tarnishing nature is produced. Of course more antimony must now be added to make up for the copper which is removed. Antimony does not harden tin as rapidly as copper, so more is necessary. An alloy of tin, 85 per cent., and antimony, 15 per cent., gives a good alloy for this purpose and wears equally as well as genuine babbitt metal. If too hard, add less antimony, and if too soft increase it.

Q.—A wire drawer wishes the recipe for a good solution for drawing fine copper wire on continuous machines. He says that he is drawing the wire from No. 20 to No. 30, but it continually breaks. He is now using fig soap, but it does not appear to answer the purpose well.

A.—An old formula for a copper wire drawing solution and one which works well, is as follows, viz.: Mix a quantity of rye meal with water in the consistency of thick oil and allow it to sour. If the operation must be hastened yeast may be added to the mixture and the whole allowed to ferment. After thoroughly soured take 2 quarts of the mixture and ½ pint of a solution of olive oil soap and add to 20 gallons of water. Use this mixture for the wire drawing. If the wire "sucks" add more oil; if it cuts the die add more meal solution.

Q.—A plater says that he finds it impossible to obtain a bright and clean surface on yellow brass and castings when dipped, and would like to know the reason. He says: "I have been trying to dip yellow brass castings made from scrap metal and with enough lead added to make them machine freely but have had no success. I have used nitric, sulphuric and hydrochloric acids mixed. Some of the castings would dip bright and some would come out black as coal. Those which came out bright would turn all colors. Our molder says that it is impossible to make castings from scrap and lead which will work freely and also dip bright.

A.—There appears to be several causes for your trouble. First it is not customary to use hydrochloric acid at all in a dip, as it gives the black color which you speak of. If you will refer to our September issue you will find a receipt for a yellow brass dip, but it contains no hydrochloric. The dip is one which is being used in all well-regulated establishments, and you will find it satisfactory if made properly.

The other cause of your difficulty may be in the use of scrap. Lead if present over a certain amount, will separate in spots, and this is apt to be the case with scrap. You do not know how many times it has been melted or by whom and each time some one has added a "small amount of lead" to the melt "just to make it machine free." How much lead does your yellow brass contain? Keep the lead down to 2 lb. per hundred and you will have no difficulty in dipping, and the mixture will machine freely.

Q.—A manufacturer sends us a sample of flat steel wire which has what is called an "aluminum finish." He wishes to know whether this is actually rust proof, and whether it can be applied to small stamped articles made from steel.

A.—This finish is simply a thin coating of zinc or galvanizing put on the wire by the process of electro-galvanizing. A very thin coating of zinc is thereby obtained in a much thinner and more uniform state than is possible with the old process of dip galvanizing. Inasmuch as the piece of wire submitted has a spring temper the advantage of the electro-galvanizing is quite obvious. As for being rust proof we would add that such a coating renders the steel about as non-corrosive as the usual galvanizing.

Q.—A user of aluminum castings says that he is experiencing trouble in obtaining them sound and free from brittleness and discoloration. When the castings are drilled they split. Instead of the bright silvery lustre they have a dull and dirty appearance.

A.—The castings are apparently too hard and more aluminum should be added to the mixture. We have called attention many times to the difficulty experienced in casting the aluminum-zinc alloys, of which the castings submitted appear to be made, as they are apt to crack in the mold. Much care and experience is necessary in casting these alloys. The dirty appearance is caused by allowing the castings to remain in the sand too long after pouring. If removed immediately they will have a much brighter appearance. This does not, however, detract from the value of the casting, but shows that zinc is present. We think if more aluminum is added to the mixture so that the proper toughness is produced there will be no difficulty. This can be determined by adding a little at a time until the proper amount has been found.

TRADE NEWS

The Manhattan Brass Company, of New York City, reports an extremely brisk business.

The offices of the International Nickel Company have been removed from 74 Broadway to 43 Exchange Place, New York.

The Allentown Brass and Iron Company, of Allentown, Pa., has begun to make iron and brass goods. The company also does nickel plating.

The Hickson Manufacturing Company, manufacturer of high art metallic bedsteads, at Muncie, Ind., reports that it is operating its plant at full capacity.

The Crescent Manufacturing Company is building a plant at Connellsville, Pa., for the manufacture of brass and copper goods. The president of the company is J. R. Stauffer.

Complete estimates (including power) for brass and copper sheet, rod and wire tube mills is the business of Mr. Hugh L. Thompson, consulting engineer, Waterbury, Conn.

The Mauser Manufacturing Company, of New York, the well known silversmiths, are building an extensive factory at Mount Vernon, N. Y., which was made necessary by their constantly increasing business.

The New Haven Smelting & Refining Company has been formed, and are occupying their factory on East street, New Haven, Conn. A general metal business and smelting and refining operation will be carried on.

The Nashua Iron & Brass Foundry property has been sold to Jas. H. Toller & Co., of that city. It is expected that the plant will be operated by the new owners, but particulars are not obtainable.

The Manufacturers' Foundry, of Waterbury, Conn., who are about to begin operations in their now foundry, inform us that the rumor that they will make brass castings is unfounded. They may take up brass casting later, but at present will confine themselves to iron.

The Dunbar, Leach, Garner Company, Attleboro, Mass., have recently enlarged their plant, and are now prepared to furnish the silversmith and manufacturing jewelry trade with sheet sterling silver and rolled gold plate, and with gold filled and seamless sterling wire and tubing.

The Elm City Brass & Rivet Company has been formed with a capital of $100,000, and will occupy the Clark & Cowles factory at Plainville, Conn. The company will put out a complete line of brass goods in addition to the line of rivets formerly made by Clark & Cowles. About 50 hands will be employed.

Messrs. Handy & Harman, of Bridgeport, Conn., and 32 Nassau St., N. Y., have compiled a table showing the weight in Troy ounces of sterling silver sheets from No. 1 to No. 36 B. & S. gauge from 1 inch to 20 inches wide. Such a table has never before been computed, and should prove valuable to all users of sterling silver. The firm is sending the table to those who desire it.

"Kant-Leek" valves are manufactured by the Burlington Brass Works, Burlington, Wis.

The Lanyon Zinc Company, of St. Louis, Mo., is sending out a card showing the various uses of sheet zinc.

The Hudson Rolling Mill Company, of Bloomfield, N. J., will start its new rolling mill early in November. The company makes a specialty of cold rolled polished sheet copper.

Readers of THE METAL INDUSTRY who use sheet metal will find a Directory of the Brass and Copper Rolling Mills on another page.

The Glacier Metal Company, of Richmond, Va., informs us that their sale of metal during September was larger than any other month.

A machinery emporium in the middle west is that of C. C. Wormer Machinery Company, of Detroit, Mich. It carries in stock a variety of brass working machinery.

The Holyoke Valve & Hydrant Company, Holyoke, Mass., has been incorporated, but have not decided whether they will build or purchase some factory already erected.

The Diamond Machine Company, of Providence, R. I., have purchased the patents of the Gorton disc grinder, and will begin its manufacture. The full line of 23 machines will be manufactured.

The Irons & Russell Mfg. Company, of Providence, R. I., manufacturing jewelers, have plans completed for a new factory building in that city. The building will be five stories high, and 75 x 135 feet.

The Hartford Machine Screw Company are making some improvements in the way of adding another story to one of their buildings in order to provide additional room for their plating department.

In order to increase the equipment of its brass foundry and other departments, the Pittsburg Valve and Fittings Company, Pittsburg, Pa., has increased the capital stock of the incorporation from $300,000 to $500,000.

The New England consumers of pig and sheet metals can obtain them from Richards & Co., 47 Friend street, Boston. The firm has pig metals of every description, and sheet metals all sizes and gauges. They also sell Parsons' manganese bronze.

The elephant brand of phosphor bronze is made by the Phosphor Bronze Smelting Company, Limited, Philadelphia. The company is also the original and sole maker in the United States of delta metal which is manufactured in the form of castings, stampings and forgings.

The Syracuse Malleable Iron Works, of Syracuse, N. Y., are making a molding machine for their own use, which, they say, is suitable for brass foundries.

Henry Wray & Son, brass founders, of Rochester, N. Y., have acquired a controlling interest in the National Brass Manufacturing Company of the same city, and are running the company in connection with their foundry business.

Johnson Service Company, of Milwaukee, is now fully installed in their new eight-story building. Their plant is strictly up to date, and one of the well-appointed departments is their neatly arranged brass foundry, with Ernest Starosti in charge.

The Atchison, Topeka & Sante Fe will hereafter make all their own car brasses. They now have five brass foundries, thoroughly equipped. Recent additions to their brass foundry department include five No. 2 Dings electro-magnetic metal separators, miscellaneous electrical machinery and other equipment.

The Franklin Manufacturing Company has been incorporated in New Haven, for the purpose of doing a plating business. The capital stock of the company is $12,000, and the officers are: President and Treasurer, F. B. Shuster; Vice-President, George D. Phillips, of Bridgeport; Secretary, F. K. Kutcher

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A complete catalogue of emery and grinding machinery has just been issued by L. Best, 45 Vesey street, New York. Mr. Best is selling agent for the Sterling Emery Wheel Manufacturing Company, of Tiffin, O. The company report a rapidly increasing business, and they are putting up an addition to their factory including a new foundry and machine shop in order that they may take care of their customers.

The Bayldon Disc Grinder shown on another page is just the machine for brass workers and others whose work requires flat surfaces for the buff. The grinder is suitable for squaring and beveling surfaces, also for grinding arcs of circles and hexagonal and octagonal shapes. By the use of the grinder a great deal of labor and time may be saved, which is usually required in machining.

The Reading Gas Fixture Works, of Reading, Pa., has been chartered recently under the laws of Pennsylvania, with a capital of $15,000. The company will manufacture gas and electrical fixtures. The officers are: A. N. Kissinger, President; C. W. Kissinger, Treasurer and General Manager; Gustavus Bromund, Superintendent. The officers expect to place the company on a good financial basis, and the business will be built up on revised lines.

E. H. Moers' Sons, James Slip, New York, metal dealers of many years standing, recently started their foundry for melting ingot brass. The firm takes pains to manufacture a good grade of ingots suitable for castings that are to be dipped and finished. It has also started to make "Arrow" babbitt metal in addition to their brands of "Arrow" solder and spelter. The "Arrow" brands of solder and spelter have been manufactured for a number of years and have given satisfaction.

The price of sheet copper has been reduced two cents per pound by the Manufacturers' Association. The latest price list will be found on our page of current metal prices.

The H. H. Franklin Manufacturing Company, makers of finished castings at Syracuse, N. Y., are building a new five-story factory, which is to be finished in December.

The Kenosha Brass and Iron Works, Kenosha, Wis., have been incorporated with a capital of $10,000 to manufacture brass and iron castings. William F. Anklain, John B. Benson and James H. Charles are the incorporators.

The Rundle Manufacturing Company, of Milwaukee, in addition to their iron foundry and enameling works, now have a well-equipped brass foundry of seven furnaces, and a complete brass finishing department. They have just turned out some very fine brass castings, several of which weighed 1,650 pounds each.

The Pittsburg Brass Company have moved both their offices and foundry to their new building, at the corner of 32d street and Pennsylvania avenue, Pittsburg. The new works comprise a brass foundry, machine and erecting shop, and shipping room. Their new building is equipped with the latest appliances for carrying on the manufacture of brass goods.

The Black Diamond File Works, of Philadelphia, have installed a 700-H. P. engine, and are making more enlargements which will increase their shop output 30 per cent. Through a typographical error we stated in our October number that the size of their new engine was 7 H. P. The Black Diamond File Works were established in 1863, and operate a large plant.

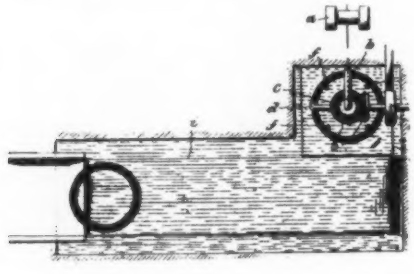
The Allyne Brass Foundry Company, of Cleveland, Ohio, is now operating its new foundry which is a modern fireproof structure 90 x 190 feet, located on Sciely Ct. and Penn. Ry. The company owns two acres of land, and has room to double its capacity. Its specialties are brass, bronze, aluminum, copper and pattern castings from the smallest size up to 5,000 pounds. It also makes aluminum castings for the automobile trade.

The office and works of the Runskool Metal Company have been moved from New York City to 1310 Niagara street, Buffalo, N. Y., where the company will have a larger plant with a more central distributing point. The company has been incorporated and will continue to manufacture anti-friction metals according to the "Runskool Idea." The Brooks' Brothers Brass Company is also located at 1310 Niagara street, Buffalo, though a separate enterprise from the metal company. The brass company is running a modern brass foundry, with facilities for turning out a class of work which has heretofore been sent to New York and Cleveland.

PATENTS

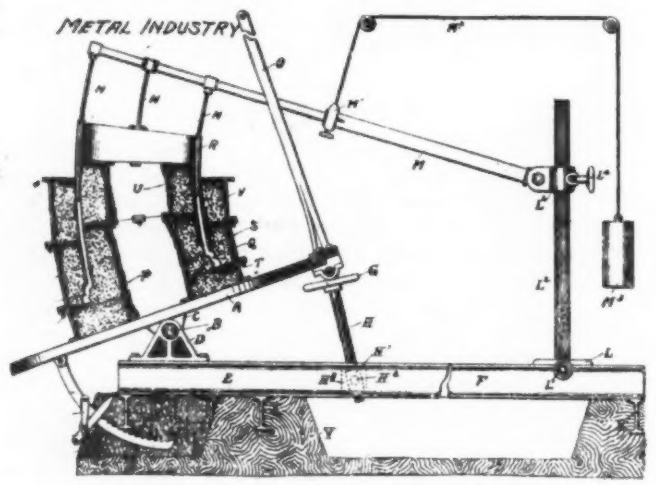
A full copy of any Patent mentioned will be furnished for Ten Cents. Address THE METAL INDUSTRY, 61 Beekman Street, New York

737,362, Aug. 25, 1903. APPARATUS FOR TREATING WIRE RODS.—Fred. H. Daniels, Worcester, Mass. An appaartus for treating wire rods, comprising a reel receiving the rods from the rolls, a



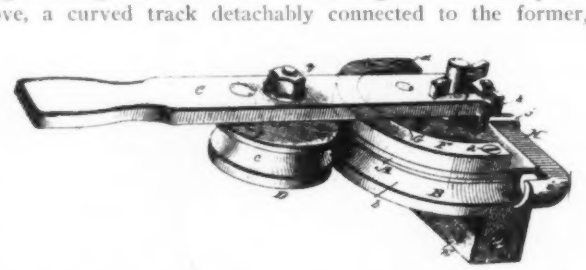
tank containing fluid in which said rods are submerged while they are being coiled, and means for receiving the coils from the reel and conducting the same through the fluid in the tanks.

739,235. September 15, 1903. MOLDING APPARATUS. Walter E. Stuart, Detroit, Mich.—In an apparatus for forming molds,



the combination with a mold-supporting table, of a sectional arm longitudinally adjustable and pivotally supported at one end adjacent to said table, a pattern carried on the free end of said adjustable arm above said table, and means for swinging said arm in a vertical plane.

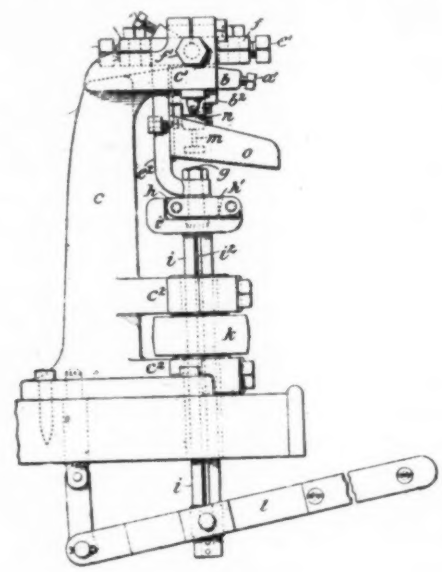
740,803. Oct. 6, 1903. TUBE-BENDING MACHINE.—Charles A. Brigel, Williamsport, Pa. A tube-bending machine, comprising a grooved former consisting of two separable sections each having a segmental groove to form when together a hemispherical groove, a curved track detachably connected to the former, a



pivoted hand-lever carrying a guide-roller, said lever having a movement lengthwise to adapt the guide-roller to the curve in the track, a grooved pressure-roller carried by the lever, and a suitable clamp adjustably connected to the former to adapt it to hold tubes of different diameters, substantially as and for the purpose set forth.

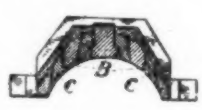
740,697, Oct. 6, 1903. COMPOSITION OF MATTER FOR USE IN POLISHING GOLD, SILVER, BRASS OR OTHER METALS.—Robert Scannell, Cleveland, Ohio. The herein-described composition of matter for polishing metals, consisting of two and one-half pounds of tripoli, one and one-half ounces of oxalic acid, one pound of common salt, one quarter oz. of carmine and eight or ten ounces of water, substantially as described.

790,492, Oct. 6, 1903. MACHINE FOR CUTTING OFF METAL RODS, &c.—Curtis H. Veeder, Hartford, Conn., assignor to the Veeder Manufacturing Company, Hartford, Conn., a Corporation of Connecticut. A machine for cutting or shearing wire, rods or bars, etc., comprising two co-operating bushings adapted to receive the



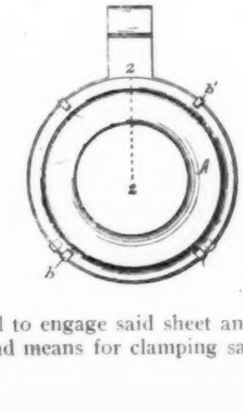
wire, rod or bar through them, and means to impart to one of said bushings with respect to the wire, rod or bar a progressive rolling movement with gradually-increasing eccentricity, substantially as described.

741,021, Oct. 13, 1903. JOURNAL-BEARING.—Charles Erickson, St. Louis. In a journal-bearing, the combination of the exterior iron shell A, provided with its series of end channels a^5 a^5 opening for babbitting a^2, internal bearing-surfaces a^4 a^4 and pin-openings a^1 a^1 to match pins b^1 b^1, and the brass filler B, provided



with its series of end prongs b^2 b^2, and pins b^1 b^1 to match the openings a^1 a^1 and undercut openings for babbitt b^3 b^3, and the babbitt metal C, filling all of the cavities between the shell A and the filler B, substantially as shown and specified.

741,274, Oct. 13, 1903. APPARATUS FOR ELECTROPLATING.—Albert R. Pritchard, Rochester, N. Y. A cathode for a plating-bath consisting of a sheet to be plated and supporting means therefor consisting of a plate against which said sheet fits and



having lugs adapted to engage said sheet and press it against said supporting-plate, and means for clamping said sheet to said plate.

Metal Prices, November 2, 1903

METALS

	Price per lb.
TIN—Duty Free.	
Straits of Malaca	25.87½
COPPER, PIG, BAR AND INGOT AND OLD COPPER—Duty Free. Manufactured 2½c. per lb.	
Lake	13.75
Electrolytic	13.50
Casting	13.25
SPELTER—Duty 1c. per lb.	
Western	5.60
LEAD—Duty Pigs, Bars and Old 2⅛c. per lb.; pipe and sheets 2½c. per lb.	
Pig Lead	4.45
ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb.	
Small lots	37.00
100 lb. lots	35.00
1,000 lb. lots	34.00
Ton lots	33.00
ANTIMONY—Duty ¾c. per lb.	
Cooksons	7.00
Halletts	6.25
Other	6.25
NICKEL—Duty 6c. per lb.	
Large lots	40 to 50
Small lots	50 to 60
BISMUTH—Duty Free	$1.50 to $2.00
PHOSPHORUS—Duty 18c. per lb.	
Large lots	45
Small lots	65 to 75
	Price per oz.
SILVER—Duty Free—Commercial Bars	$0.60
PLATINUM—Duty Free	19.00
GOLD—Duty Free	20.00
QUICKSILVER—Duty 7c. per lb. Price per Flask	47.50

Sheet Lead, 7¾c. per lb., 20 per cent. off.
Lead Pipe, 6¾c. per lb., 20 per cent. off.
Zinc—Duty, Sheet, 2c. per lb.; 600-lb. casks, 7.50c. per lb., open, 8c. per lb.
Tobin Bronze—Rods, Unfinished, 19c.
Tobin Bronze—Rods, Finished, 20c.

PRICE FOR ALUMINUM BRONZE INGOTS.

	Per pound.
2½ per cent	19c.
5 per cent	19½c.
7½ per cent	20½c.
10 per cent	21½c.

Manganese Bronze, Ingots	16½c.
Phosphor Bronze, Ingots	15 to 18c.
Silicon-Copper, Ingots	34 to 36c.

OLD METALS

	Buying.	Selling.
Heavy Cut Copper	12.00c.	13.00c.
Copper Wire	11.75c.	12.50c.
Light Copper	10.75c.	11.50c.
Heavy Mach. Comp	10.75c	11.75c.
Heavy Brass	8.00c.	8.50c.
Light Brass	6.25c.	6.75c.
No. 1 Yellow Brass Turnings	6.75c.	7.50c.
No. 1 Comp. Turnings	9.00c.	10.00c.
Heavy Lead	4.00c.	4.25c.
Zinc scrap	4.25c.	4.50c.
Scrap Aluminum, sheet, pure	22.00c.	25.00c.
Scrap Aluminum, cast, alloyed	16.00c.	20.00c.
Old Nickel	15.00c.	25.00c.

PRICES OF SHEET COPPER

SIZES OF SHEETS.		96oz. & over 75 lb. sheet 30x60 and heavier	64oz. to 96oz. 50 to 75 lb. sheet 30x60	32oz. to 64oz. 25 to 50 lb. sheet 30x60	24oz. to 32oz. 18¾ to 25 lb. sheet 30x60	16oz. to 24oz. 12½ to 18¾ lb. sheet 30x60	14oz. and 15oz. 11 to 12½ lb sheet 30x60
		CENTS PER POUND.					
Not wider than 30 ins	Not longer than 72 ins.	18	19	19	19	19	20
	Longer than 72 ins. Not longer than 96 ins.	18	19	19	19	19	20
	Longer than 96 ins.	18	19	19	19	19	21
Wider than 30 ins. but not wider than 36 ins.	Not longer than 72 ins.	18	19	19	19	19	21
	Longer than 72 ins. Not longer than 96 ins.	18	19	19	19	19	21
	Longer than 96 ins. Not longer than 120 ins.	18	19	19	19	20	22
	Longer than 120 ins	18	19	19	20	21	
Wider than 36 ins. but not wider than 48 ins.	Not longer than 72 ins.	18	19	19	20	21	23
	Longer than 72 ins. Not longer than 96 ins.	18	19	19	20	22	24
	Longer than 96 ins. Not longer than 120 ins.	18	19	19	21	23	27
	Longer than 120 ins.	18	19	20	22	25	
Wider than 48 ins. but not wider than 60 ins.	Not longer than 72 ins.	18	19	19	20	22	25
	Longer than 72 ins. Not longer than 96 ins.	18	19	19	21	23	28
	Longer than 96 ins Not longer than 120 ins.	18	19	20	22	25	
	Longer than 120 ins	19	20	21	23	27	
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 ins.	18	19	20	22	27	
	Longer than 96 ins. Not longer than 120 ins	18	19	21	24	29	
	Longer than 120 ins.	19	20	22	27		
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 ins.	19	20	22	25		
	Longer than 96 ins. Not longer than 120 ins.	20	21	23	26		
	Longer than 120 ins.	21	22	24	28		
Wider than 108 ins.	Not longer than 132 ins.	22	23	25			
	Longer than 132 ins.	23	24	27			

Rolled Round Copper, ⅜ inch diameter or over, 21 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, wider than 17 inches, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, 2½c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

Metal Prices, November 2, 1903

COPPER BOTTOMS, PITS AND FLATS

Net Cash Prices.

14 oz. to square foot, and heavier, per lb. .... 23c.
Lighter than 10 oz. .... 24c.
10 oz. and up to 12 oz. .... 26c.
12 oz. and up to 14 oz. to square foot, per lb. .... 29c.
Circles less than 8 in diam., 2c. per lb. additional.
Circles over 13 in. diam., are not classed as Copper Bottoms.
Polished Copper Bottoms and Flats, 1c. per lb. extra.

PRICE LIST FOR ROLL AND SHEET BRASS

**Prices are for 100 lbs. or more of sheet metal in one order.
Brown & Sharpe's Gauge the Standard.**

Common High Brass	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Wider than and including	2 12	12 14	14 16	16 18	18 20	20 22	22 24	24 26	26 28	28 30
To No. 20 inclusive..	.22	.23	.25	.27	.29	.31	.33	.36	.39	.42
Nos. 21, 22, 23 and 24	.22	.24	.26	.28	.30	.32	.34	.37	.40	.43
Nos. 25 and 26........	.23	.24½	.27	.29	.31	.33	.35	.38	.41	.44
Nos. 27 and 28........	.23	.25	.28	.30	.32	.34	.36	.39	.42	.45

Add ½ cent per lb. additional for each number thinner than Nos. 28 to 38, inclusive.

Add 7 cents per lb. for sheets cut to particular lengths, not sawed, of proportionate width.

Add for polishing on one side, 40 cents per square foot; on both sides, double this price.

Brazing, Spinning and Spring Brass, 1 cent more than Common High Brass.

Extra Quality Brazing, Spinning and Spring Brass, 2 cents more than Common High Brass.

Low Brass, 4 cents per lb. more than Common High Brass.

Gilding, Rich Gold Medal and Bronze, 7 cents per lb. more than Common High Brass.

Discount from List, 30 per cent.

PRICE LIST FOR BRASS AND COPPER WIRE

BROWN & SHARPE'S GAUGE THE STANDARD.	Com. High Brass	Low Brass	Gilding Bronze and Copper
All Nos. to No. 10, Inc	$0.23	$0.27	$0.31
Above No. 10 to No. 16..	.23¼	.27¼	.31¼
Nos. 17 and 18..........	.24	.28	.32
" 19 and 20..........	.25	.29	.33
No. 21..........	.26	.30	.34
" 22..........	.27	.31	.35
" 23..........	.28	.32	.36
" 24..........	.30	.34	.38

Discount, Brass Wire, 30 per cent.; Copper Wire, 40 per cent.

PRICES FOR SEAMLESS BRASS TUBING

From 2 in. to 3¾ in. O. D. Nos. 4 to 12 Stubs Gauge, 19c. per lb. Seamless Copper Tubing, 22c. per lb.
For other sizes see Manufacturer's List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe size.....	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.......	33	29	20	19	18	18	18	18	18	18	18	20	20	22	24	25

BRAZED BRASS TUBING

Brown & Sharpe's Gauge the Standard.

	Per lb.
Plain Round Tube, ¾ in. up to 2 in., to No. 19, inc.	$0 35
" " " ⅝ " " ¾ " to No. 19, "	36
" " " ½ " " ⅝ " to No. 19, "	38
" " " ⅜ " " ½ " to No. 19, "	41
" " " 5/16 " " ⅜ " to No. 19, "	48
" " " ¼ " " 5/16 " to No. 19, "	65
" " " 3/16 " " ¼ " to No. 19, "	1 00
" " " ⅛ " " 3/16 " to No. 19, "	1 50
Smaller than ⅛ inch..........	Special
2 inch to 3 inch, to No. 19, inclusive..........	38
3 inch..........	40
Over 3 inch to 3½ inch..........	45
Over 3½ inch..........	50

Bronze and copper advance 3 cents. Discount 30 per cent.

PRICE LIST FOR SHEET ALUMINUM

PLATE AND SHEET PRICE LIST.—B. & S. GAUGE.
Prices are for 50 pounds or more at a time. Less quantities, 5 cents per pound additional. Charges made for boxing.

Wider Than.. ... And Including...	*3 in. 12 in. in coils.	6 in. 14 in.	14 in. 16 in.	16 in. 18 in.	18 in. 20 in.	20 in. 24 in.	24 in. 30 in.	30 in. 36 in.	36 in. 40 in.	40 in. 45 in.	45 in. 50 in.	50 in. 55 in.	55 in. 60 in.	Polishing One Side.	Sat. Fin. without Lacquer. One Side.
No. 13 & heavier..	......	42	44	44	44	44	47	47	47	48	48	49	50	2	6
" 14..........	......	42	44	44	44	44	47	47	47	48	48	49	50	2	6
" 15..........	......	42	44	44	44	44	47	47	47	48	48	49	50	2	7
" 16..........	......	42	44	44	44	44	47	47	47	48	48	49	50	2	8
" 17..........	......	42	44	44	44	44	47	47	47	48	48	49	50	3	9
" 18..........	......	42	41	44	44	44	47	47	50	51	51	54	57	3	10
" 19..........	......	42	44	44	44	44	47	48	51	52	52	56	59	4	11
" 20..........	42	44	44	44	44	46	49	50	52	53	53	58	61	4	12
" 21..........	42	46	46	46	46	48	51	52	58	59	62	65	......	5	14
" 22..........	42	46	46	46	48	48	51	55	59	61	64	......	......	5	16
" 23..........	42	46	46	46	48	48	51	57	60	64	......	......	......	6	18
" 24..........	42	46	48	50	50	50	53	59	62	......	......	......	......	6	20
" 25..........	44	47	49	51	51	51	54	61	......	......	......	......	......	7	23
" 26..........	44	47	50	54	54	54	59	......	......	......	......	......	......	8	25
" 27..........	44	48	52	56	56	57	62	......	......	......	......	......	......	10	28
" 28..........	44	48	54	56	57	57	64	......	......	......	......	......	......	11	32
" 29..........	46	49	56	58	60	60	69	......	......	......	......	......	......	13	36
" 30..........	46	50	58	60	64	70	77	......	......	......	......	......	......	15	40
" 31..........	48	52	60	63	68	76	......	......	......	......	......	......	......	17	44
" 32..........	50	54	62	66	74	82	......	......	......	......	......	......	......	19	50
" 33..........	52	56	......	......	......	......	......	......	......	......	......	......	......	21	57
" 34..........	55	60	......	......	......	......	......	......	......	......	......	......	......	25	66
" 35 & 36.......	1 67	Not wider than 6 in.	......	......	......	......	......	......	......	......	......	......	......	Polished two sides double above prices.	Satin Finish two sides double above prices.
" 37 & 38.......	1 98		......	......	......	......	......	......	......	......	......	......	......		
" 39 & 40.......	2 22		......	......	......	......	......	......	......	......	......	......	......		
" .003" to .0015"..	2 42		......	......	......	......	......	......	......	......	......	......	......		
Less than .0015"..	2 66		......	......	......	......	......	......	......	......	......	......	......		

Additional charge for slitting coiled sheet in widths less than 3 in. and flat rolled sheets in widths less than 6 in.
All columns except the first are for Flat Rolled Sheets.

Discounts as follows are given for sheet orders over 200 pounds.

200 to 1,000 pounds.......... 10 per cent. off list.
1,000 to 2,000 " 10 per cent. and 2 " "
2,000 to 4,000 " 10 " " 3 " "
4,000 pounds and over 10 " " 5 " "

Sheets polished or satin-finished on both sides, double the price for one side.

Price Per Foot of Seamless Aluminum Tubing.

(CHARGES MADE FOR BOXING.)

THICKNESS OF WALL IN STUBS' GAUGE.

Outside Diameter in Inches.	No. 12.	No. 14.	No. 16.	No. 18.	No. 20.	No. 22.	No. 24.		Outside Diameter in Inches.
1-4.....	......	......	......	10	9	8	7		1-4
5-16.....	......	......	......	11	9	8	7		5-16
3-8.....	......	......	......	12	9	8	7		3-8
1-2.....	......	......	17	14	11	9	8		1-2
5-8.....	......	......	21	16	13	12	......		5-8
3-4.....	......	......	25	19	16	14	......		3-4
7-8.....	......	......	28	22	18	16	......		7-8
1.........	......	......	30	25	21	19	......		......1 00
1 1-4.....	......	......	36	30	25	......	......		......1 14
1 1-2.....	......	52	43	35	28	......	......		......1 1-2
1 3-4.....	......	60	50	41	33	......	......		......1 3-4
2.........	84	68	58	47	37	......	......		......2 00

Discount 20 to 30 per cent.

ALUMINUM

Drawn Rod and Wire Price List.—B. & S. Gauge.

Diameter B.& S.G'ge.	0000 to No.10	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price per lb	$ 38	38½	38½	0 39	39½	0 40	40½	0 41	0 42	0 43	0 44	0 47	0 52

200 lbs. to 30,000 lbs., three cents off list.
30,000 lbs. and over, four cents off list.

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Additional charge for slitting coiled sheet in widths less than 3 in. and flat rolled sheets in widths less than 6 in.
All columns except the first are for Flat Rolled Sheets.

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